

**REMARKS**

Claims 1-20 are pending. Claims 12, 13, and 15-18 have been amended. In particular, the dependencies of claims 12, 13, and 15-17 have been amended to correct typographical errors, and claim 18 has been amended to correct a grammatical error. No new matter has been added.

Claims 1-20 are listed as rejected on the June 4, 2002 Office Action Summary and on the September 24, 2002 Advisory Action. In particular, claims 1, 6-9, 11, 17, and 18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over King in view of Wang, and claims 4, 5, 10, 12-16, 19, and 20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over King in view of Wang and further in view of Foley. It is respectfully submitted that claims 2 and 3 are not subject to rejection, and therefore, Applicants request Examiner's indication that claims 2 and 3 are allowable as they stand.

**Rejection of claims 1, 6-9, 11, 17, and 18 under 35 U.S.C. § 103(a)**

Claims 1, 6-9, 11, 17, and 18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over King in view of Wang. It is respectfully submitted that claims 1, 6-9, 11, 17, and 18 are patentable for the reasons set forth below.

Claims 1, 6-9, 11, 17, and 18 include features that are neither disclosed nor suggested by the cited references, taken alone or in combination, namely, as represented by claim 1:

A dual mode device for generating a cross product or a dot product from a first vector and a second vector, the first vector having a first set of components and the second vector having a second set of components, the device comprising:

a dual mode controller receiving the first and second vectors, the dual mode controller being configured to select vector components for evaluating a cross product component or a dot product in response to a first signal, the first signal indicating whether to generate a cross product component or a dot product; and

a dual mode unit coupled to receive the selected vector components for generating the cross product component or the dot product in response to the first signal. (emphasis added)

The present invention, as embodied in claim 1, is directed to a dual mode device for generating vector cross products and dot products. The dual mode device generates a cross product or a dot product in response to a signal. A dual mode

controller receives first and second vectors and is configured to select vector components for evaluating a cross product component or a dot product in response to the signal. A dual mode unit is coupled to receive the selected vector components and then generate the cross product or the dot product.

King teaches a system for computing a dot product but does not mention or suggest the need to calculate cross products. Wang fails to remedy the deficiency of King. In fact, Wang teaches a system for computing a cross product but does not mention or suggest the need to calculate dot products. It is respectfully submitted that there is no motivation to combine King and Wang because there is an absence of a reference to calculating dot products in Wang and to calculating cross products in King.

The Examiner states that it would have been obvious to combine the inventions of Wang and King “because there are many fields in the computer art[s], such as graphics and simulation, where dot product and cross product operations are used extensively.” (June 4, 2002, Official Action, page 9). Applicant does not dispute that presently, use of both dot product and cross products in 3D graphics have become more common; however, at the time of Applicant’s invention, only dot products were typically used in the graphics and simulations fields, as recognized by the Applicant in the application, as originally filed:

“Conventional lighting models typically model one or more lighting effects such as diffuse reflection, specular reflection, and spotlighting, each of which is typically determined by evaluating a dot product of two vectors.” (page 2, lines 8-10.)

Thus, at the time of Applicant’s invention, it would not have been obvious to combine King and Wang. Because there is no evidence of record indicating that those of ordinary skill would have been motivated by the references to practice the claimed invention, much less any evidence that they would have been impelled to do so, the rejection for alleged obviousness in view of the Wang and King references is improper and should be withdrawn.

Moreover, applicant submits that King and Wang were improperly combined using hindsight reconstruction, using Applicant’s claims to pick and choose among

the prior art. See *In re Gorman*, 933 F.2d 982 (Fed. Cir. 1991) (noting where it was necessary to select elements of various teachings that “[I]t is impermissible, however, simply to engage in hindsight reconstruction of the claimed invention, using the applicant’s structure as a template and selecting elements from references to fill the gaps.) Here, the Examiner’s stated motivation to combine the references is that “there are many fields in the computer art[s], such as graphics and simulation, where dot product and cross product operations are used extensively.” Notably, the Examiner has not pointed out a suggestion to combine found in the references themselves but has merely indicated that the combination would be advantageous.

The claimed invention may seem simple. Nevertheless, “the simplicity of new inventions is often the very thing that is not obvious before they are made .... The fact that the invention seems simple after it is made is not determinative of the question of obviousness.” *In re Van Wanderhorn, Worthley, and Conolli*, 154 USPQ 20, 24 (CCPA 1967). Unfortunately, the Office Action has converted the simplicity of the claimed invention into obviousness.

Independent claims 11 and 18 include features similar to those described above with respect to claim 1. Based on the foregoing, claims 1, 11, and 18, and those claims dependent therefrom, including claims 6-9 and 17, should not be rejected as being unpatentable over King in view of Wang, taken alone or in combination. Thus, claims 1, 6-9, 11, 17, and 18 are patentable for the reasons set forth above. Withdrawal of the rejections of claims 1, 6-9, 11, 17, and 18 under 35 U.S.C. §103(a) is respectfully requested.

**Rejection of claims 4, 5, 10, 12-16, 19, and 20 under 35 U.S.C. § 103(a)**

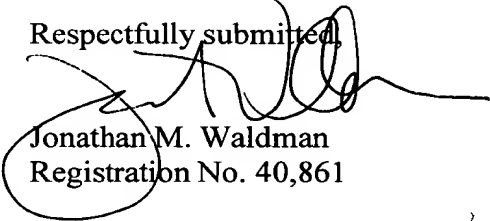
Claims 4, 5, 10, 12-16, 19 and 20 have been rejected under 35 U.S.C. §103(a) as being unpatentable over King in view of Wang and Foley. Claims 4, 5, and 10 are dependent on claim 1, claims 12-16 are dependent on claim 11, and claims 19 and 20 are dependent on claim 18, and are patentable for at least the reasons set forth above. Foley fails to cure the deficiencies of King and Wang. Although Foley describes the use of a surface normal in determining diffuse illumination, there is no teaching or suggestion anywhere in Foley to generate a cross product or a dot product based on a signal, as required by the claims.

Therefore, withdrawal of the rejection of claims 4, 5, 10, 12-16, 19, and 20 under 35 U.S.C. §103(a) is respectfully requested.

In view of the above amendments and remarks, Applicants respectfully submit that the present application is in condition for allowance. Reconsideration of the application and an early Notice of Allowance are respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

Respectfully submitted,



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**VERSION WITH MARKINGS TO SHOW CHANGES MADE****IN THE CLAIMS:**

Claims 12, 13, and 15-18 have been amended as follows.

12. (Once Amended) The dual mode device as recited in claim [10] 11, wherein the dual mode controller changes the sign of one or more selected vector components for transmission to the dual mode units when the first signal indicates generation of the cross product.

13. (Once Amended) The dual mode device as recited in claim [10] 11, wherein the first vector includes components  $A_x$ ,  $A_y$ , and  $A_z$  and the second includes components  $B_x$ ,  $B_y$ , and  $B_z$  such that the dual mode units generate the cross product by producing cross product components  $C_x$ ,  $C_y$ , and  $C_z$ .

15. (Once Amended) The dual mode device as recited in claim [10] 11, wherein the dual mode units are used in a lighting subsystem that is configured to generate a diffuse light value, a specular light value, and a spotlight value.

16. (Once Amended) The dual mode device as recited in claim [10] 11, wherein each of the dual mode units includes a plurality of multipliers and adders that are arranged to generate the associated cross product component or the dot product.

17. (Once Amended) The dual mode device as recited in claim [7] 16, wherein the dual mode unit uses at least one multiplier and at least one adder to generate the cross product component or the dot product.

18. (Twice Amended) In computer system having a graphics subsystem comprising a dual mode device, the dual mode device comprising a dual mode controller and a dual mode unit, a method for generating a cross product or a dot product from a first vector and a second vector, the first vector having a first set of components and the second vector having a second set of components, the method comprising:

receiving the first and second vectors for generating a cross product component or a dot product at the dual mode controller;

receiving a first signal indicating whether to generate a cross product component or a dot product at the dual mode controller;

selecting vector components for evaluating the cross product component or the dot product in response to the first signal;

sending the selected vector components to the dual mode unit; and

in response to the first signal and the selected vector components, generating the cross product component when the first signal indicates generation of the cross product component and generating the dot product when the first signal indicates generation of the dot product.